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**NEW MEXICO
ENVIRONMENT DEPARTMENT**

Ground Water Quality Bureau

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James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

January 15, 2021

Kevin Bertrand, Sr. Manager
Nutrien Artesia
5296 Harvest Lake Drive
Loveland, CO 80538

RE: UIC General Discharge Permit, DP-1919, Nutrien Artesia

Dear Mr. Bertrand:

The New Mexico Environment Department (NMED) hereby provides notice to Nutrien Ag Solutions, Inc. of the proposed approval of Ground Water General Discharge Permit, DP-1919, (copy enclosed), pursuant to Subsection H of 20.6.2.3108 NMAC. NMED will publish notice of the availability of the draft Discharge Permit in the near future for public review and comment and will forward a copy of that notice to you.

Prior to making a final ruling on the proposed Discharge Permit, NMED will allow 30 days from the date the public notice is published in the newspaper for any interested party, including the Discharge Permit applicant, i.e., yourself, to submit written comments and/or a request a public hearing. A hearing request shall set forth the reasons why a hearing is requested. NMED will hold a hearing in response to a timely hearing request if the NMED Secretary determines there is substantial public interest in the proposed Discharge Permit.

Please review the enclosed draft Discharge Permit carefully. Please be aware that this Discharge Permit may contain conditions that require the permittee to implement operational, monitoring or closure actions by a specified deadline.

NMED is taking all necessary precautions to reduce the spread of COVID-19. Given the current public health emergency, all monitoring and permit required activities must be conducted in accordance with the Governor's current Executive Orders and Public Health Orders. Please help to keep New Mexicans safe by visiting the New Mexico Department of Health's website to learn

Kevin Bertrand
January 15, 2021
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how you can play a role in stopping the spread of COVID-19. That website is cv.nmhealth.org. If you believe the current COVID-19 restrictions impact your ability to safely complete one or more permit required tasks, please include this information with your submittals.

Please submit written comments or a request for hearing to my attention at the address above or via email to andrewc.romero@state.nm.us. If NMED does not receive written comments or a request for hearing during the public comment period, the draft Discharge Permit will become final.

Thank you for your cooperation during the review process. Feel free to contact me with any questions at (505) 660-8624.

Sincerely,

Andrew Romero
Environmental Scientist

Encl: Draft General Discharge Permit, DP-1919

cc: Steve Meninger, smeninger@rubikenv.com



**NEW MEXICO ENVIRONMENT DEPARTMENT GROUND
WATER QUALITY BUREAU**



UNDERGROUND INJECTION CONTROL

GENERAL DISCHARGE PERMIT

Certified Mail- Return Receipt Requested

Facility Name: NUTRIEN ARTESIA, NM FACILITY

Facility Location: 103 East Mill Road, Artesia, NM
S5 T17S R26E
Eddy County

Legally Responsible Party: NUTRIEN AG SOLUTIONS, INC.
5296 Harvest Lake Drive, Loveland CO 80538
303-261-2982

Remediation Oversight Agency Contact: GWQB - REMEDIATION OVERSIGHT
SECTION Paul Chamberlain
505-827-9669
GWQB - REMEDIATION OVERSIGHT SECTION

Remediation or Injection Plan Identification: STAGE 2 ABATEMENT PLAN MODIFICATION &
WORK PLAN - 2/3/2020

Permitting Action: New DP-1919

PPS Contact Andrew Romero
(505) 660-8624

EFFECTIVE DATE: XX/XX/XXXX **TERM ENDS:** XX/XX/XXXX

Michelle Hunter
Chief, Ground Water Quality Bureau

[Subsection H of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.1]

I. UIC GENERAL DISCHARGE PERMIT

The New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) issues this Underground Injection Control General Discharge Permit (UIC Permit) for the subsurface emplacement of additive fluids through a Class V UIC injection well for the purpose of facilitating vadose zone or groundwater remediation. The GWQB issues this UIC Permit to NUTRIEN AG SOLUTIONS, INC. (Permittee) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Ground and Surface Water Protection Regulations, 20.6.2 NMAC.

In issuing this UIC Permit, the GWQB has determined that the requirements of Subsection C of 20.6.2.3109 NMAC have been met. The activities authorized by this UIC Permit are principally governed by STAGE 2 ABATEMENT PLAN MODIFICATION & WORK PLAN - 2/3/2020 (Injection Plan), under the authority of GWQB - REMEDIATION OVERSIGHT SECTION, with oversight by the GWQB - REMEDIATION OVERSIGHT SECTION. Compliance with this UIC Permit requires compliance with the terms, requirements, and conditions of the Injection Plan. The term of this UIC Permit shall be no longer than five years from the effective date of this UIC Permit.

The injection activities, the location of the injection site, the type of injection and quantities of additives being used are briefly described as follows:

Injection Activities (summary: including injection well type, number of wells, and injection frequency)

Copy of the Injection Plan Attached (required): ☒

Summary of Injection Plan: Lactoil will be injected into groundwater at a maximum depth of 40 feet beneath the ground surface to remediate nitrate concentrations. Injections will occur at a maximum of 14 locations at the facility (see attached figure).

Injection Site Information

Depth to most shallow groundwater (required): 25 ft

Existing concentration of total dissolved solids (TDS) in groundwater (required): 6,000mg/L

Location (required): 103 East Mill Road, Artesia, NM

County (required): Eddy

Latitude: 32.868588

Longitude: -104.398557

Map Showing Area of Injection Sites Attached (required): ☒

Additives Being Used (including volumes, manufacturer, and mixing ratios)

A total of 2,610 pounds (330 gallons) of Lactoil will be injected during the project. The Lactoil will be mixed with 3,000 gallons of water prior to injection to create an approximate 10% solution. The Lactoil is a soy microemulsion manufactured by JRW Bioremediation, LLC.

Anticipated Precipitation, Dissolution, Adsorption, and Desorption Products

Lactoil is comprised of fermentable carbon sources that stimulate microbial growth, which results in depletion of dissolved oxygen and lowering of the oxidation reduction potential in groundwater. As the system becomes more anaerobic, denitrifying bacteria will use nitrate as the electron acceptor and should reduce nitrate concentrations in the groundwater.

Public Notice Posting Locations

2 inch by 3 inch Newspaper Ad required for Renewal applications.

Newspaper: N/A - This is a modification of existing Stage 2 Abatement Plan

3 inch by 4 inch Newspaper Ad required for New, Modification, and Renewal/Modification applications.

Newspaper: Ad will be placed in the Artesia Daily Press newspaper

2 feet by 3 feet sign posted for 30 days in a location conspicuous to the public at or near the facility required for New, Modification, and Renewal/Modification applications.

Sign Location: The sign will be posted on front gate at the entrance of the facility.

8.5 inch by 11 inch or larger posted off-site location conspicuous to the public (e.g. public library). Required for New, Modification, and Renewal/Modification applications.

Flyer Location: Posting will be placed in the window or door viewable from outside the library's entrance - Artesia Public Library - 205 W Quay, Artesia, NM 88210

This UIC Permit consists of the complete and accurate completion of this UIC Permit form as determined by the GWQB.

Issuance of this UIC Permit does not relieve the Permittee of the responsibility to comply with the WQA, WQCC Regulations, and any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

Signatures

Signature must be that of the person listed as the legally responsible party on this application.

I, the applicant, attest under penalty of law to the truth of the information and supporting documentation contained in this application for an Underground Injection Control General Discharge Permit.

Applicant's Signature

Signature: Kevin Bertrand

Date: November 19, 2020

Printed Name: Kevin Bertrand

Title: Sr. Manager, Remediation

DRAFT

II. FINDINGS

In issuing this UIC Permit, GWQB finds:

1. The Permittee is injecting fluids so that such injections will move directly or indirectly into groundwater within the meaning of Section 20.6.2.3104 NMAC.
2. The Permittee is injecting fluids so that such fluids will move into groundwater of the State of New Mexico which has an existing concentration of 10,000 mg/L or less of TDS within the meaning of Subsection A of 20.6.2.3101 NMAC.
3. The Permittee is using a Class V UIC well as described in 20.6.2.5002(B)(5)(d)(ii) NMAC for in situ groundwater remediation by injecting a fluid that facilitates vadose zone or groundwater remediation.
4. The Permittee is injecting fluids into groundwater in order to achieve the remediation goals identified in the Injection Plan.

III. AUTHORIZATION TO DISCHARGE

The Permittee is authorized to inject chemical additives into groundwater in accordance with this UIC Permit and the Injection Plan under the oversight of GWQB - REMEDIATION OVERSIGHT SECTION.

[20.6.2.3104 NMAC, Subsection C of 20.6.2.3106 NMAC, Subsection C of 20.6.2.3109 NMAC]

IV. CONDITIONS

The conditions of this UIC Permit shall be complied with by the Permittee and are enforceable by GWQB.

1. The Permittee shall perform remediation activities in accordance with the Injection Plan and shall notify GWQB of any changes prior to making them.

[20.6.2.3107 NMAC]

2. The Permittee shall monitor the injection activities and their effects on groundwater quality as required by the Injection Plan and shall provide GWQB with electronic copies of the required reporting and any pertinent documentation of activities at the site.

[20.6.2.3107.A NMAC, 20.6.2.3109.A NMAC]

3. *If the GWQB or the Permittee identifies any failure of the Injection Plan or this UIC Permit to comply with 20.6.2 NMAC not specifically noted herein, GWQB may require the Permittee to submit a corrective action plan and a schedule for completion of corrective actions to address the failure.*

Additionally, the GWQB may require the Permittee to submit a proposed modification to the Injection Plan, this UIC Permit, or both.

[20.6.2.3107.A NMAC, 20.6.2.3109.E NMAC]

4. *ADDITIONAL MONITORING REQUIREMENTS – (RESERVED) - Placeholder for any added monitoring and reporting requirements.*
5. *TERMINATION – Within 30 days of completion of activities authorized by this UIC Permit the Permittee shall submit a closure report and a request to terminate the UIC Permit to the GWQB for its approval. The closure report shall identify how the injection well(s) was (were) closed in accordance with the Injection Plan. The Permittee shall provide GWQB - REMEDIATION OVERSIGHT SECTION with a copy of this closure report.*

[20.6.2.5005 NMAC, 19.27.4 NMAC]

6. *INSPECTION and ENTRY – The Permittee shall allow a representative of the NMED to inspect the facility and its operations subject to this UIC Permit and the WQCC regulations. The GWQB representative may, upon presentation of proper credentials, enter at reasonable times upon or through any premises in which a water contaminant source is located or in which are located any records required to be maintained by regulations of the federal government or the WQCC. The Permittee shall allow the GWQB representative to have access to, and reproduce for their use, any copy of the records, and to perform assessments, sampling or monitoring during an inspection for the purpose of evaluating compliance with this UIC Permit and the WQCC regulations.*

Nothing in this UIC Permit shall be construed as limiting in any way the inspection and entry authority of GWQB under the WQA, the WQCC Regulations, or any other local, state, or federal regulations.

[20.6.2.3107.D NMAC, NMSA 1978, §§ 74-6-9.B and 74-6-9.E]

7. MODIFICATIONS and/or AMENDMENTS – In the event the Permittee proposes a change to the injection plan that would result in a change in the volume injected; the location of the injections; or the concentration of the additives being injected by the facility, the Permittee shall notify GWQB prior to implementing such changes. The Permittee shall obtain approval (which may require modification of this UIC Permit) by GWQB prior to implementing such changes.

[20.6.2.3107.C NMAC, 20.6.2.3109.E and G NMAC]

8. COMPLIANCE with OTHER LAWS – Nothing in this UIC Permit shall be construed in any way as relieving the Permittee of the obligation to comply with all applicable federal, state, and local laws, regulations, permits, or orders.

[NMSA 1978, § 74-6-5.L]

9. PERMIT FEES – Payment of permit fees is due at the time of UIC Permit approval. Permit fees shall be paid in a single payment remitted to GWQB no later than 30 days after the UIC Permit effective date.

Permit fees are associated with issuance of this UIC Permit. Nothing in this UIC Permit shall be construed as relieving the Permittee of the obligation to pay all permit fees assessed by GWQB. A Permittee that ceases injecting or does not commence injecting during the term of the UIC Permit shall pay all permit fees assessed by GWQB. An approved UIC Permit shall be suspended or terminated if the facility fails to remit a payment by its due date.

[20.6.2.3114.F NMAC, NMSA 1978, § 74-6-5.K]



STAGE 2 ABATEMENT PLAN MODIFICATION

Nutrien Ag Solutions, Inc.
Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

February 3, 2020

Submitted to:

Paul Chamberlain
New Mexico Environmental Department
Remediation Oversight Section
1190 S. Saint Francis Drive
Santa Fe, New Mexico 87505

Prepared for:

Nutrien Ag Solutions, Inc.
5296 Harvest Lake Drive
Loveland, Colorado 80538

Prepared by:

Rubik
320 Flint Street
Reno, Nevada 89501

Reviewed by:

Todd Leonard
Principal

Prepared and Approved by:

Stephen A. Meninger, PG
Senior Geologist

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Appendix B	Injection Product Information Sheet

1.0 INTRODUCTION

On behalf of Nutrien Ag Solutions, Inc. (Nutrien), Rubik developed this Stage 2 Abatement Plan Modification for the former Agrilience facility located at 103 East Mill Road in Artesia, New Mexico (**Figure 1**). The plan modification was proposed by Nutrien in an October 10, 2019 meeting with the New Mexico Environmental Department (NMED) and was developed in accordance with New Mexico Administrative Code (NMAC) Section 20.6.2.4000.

1.1 Objective

The objective of this project is to reduce nitrate concentrations in the groundwater.

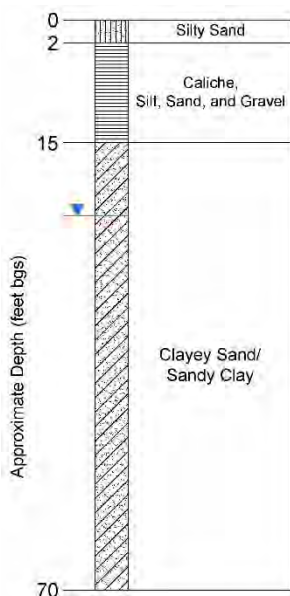
2.0 SITE DESCRIPTION

The facility has operated as a retail distribution of bulk dry and liquid fertilizers since the mid-1990s. The current and former site features are depicted on **Figure 2**.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Geology

The geology beneath the site is summarized below:



Historical soil boring locations and a geologic cross section path are shown on **Figure 3** and the geologic cross section is presented as **Figure 4**.

3.2 Hydrogeology

In August 2019, the depth to groundwater beneath the site was approximately 25 feet below the ground surface (bgs). Groundwater elevations have declined approximately 10 feet since 2017. Groundwater beneath the site generally flows to the southeast at 0.005 feet/foot. Well construction details are summarized in **Table 1** and historical groundwater elevations are summarized in **Tables 2** through **4**.

4.0 ABATEMENT HISTORY

In 2008, soil samples were collected across the site and nitrate as nitrogen (-N) concentrations exceeded the current NMED soil screening level of 425 milligrams per kilogram (mg/kg) at 1-foot bgs near the fertilizer storage areas, load pads, and above ground storage (AST) containment (Terracon, 2009). The concentrations generally attenuated with depth and did not exceed the standard at 4 feet bgs, except near the fertilizer storage areas. Historical soil sampling locations are shown on **Figure 3** and analytical results are summarized in **Table 5**.

Groundwater monitoring and sampling began at the site in 2009 and nitrate-N concentrations have continued to exceed the NMED standard of 10 milligrams per liter (mg/L). Monitoring well locations are shown on **Figure 2** and historical groundwater monitoring and sampling data is summarized on **Tables 2** through **4**.

In 2010, the facility was upgraded with secondary concrete containment for the ASTs and larger load pads in the fertilizer storage areas.

In 2015, well MW-2 was replaced due to decreasing groundwater elevations and to have a monitoring well screened over the same interval as the injections. A solution of Lactoil and water was injected upgradient of well MW-2R to decrease nitrate-N concentrations in groundwater (Rubik, 2015). Soil near well MW-3 was excavated to between 4 and 8 feet bgs to the extent possible based on the locations of structures, underground utilities, and railroad tracks. Since the injections, nitrate-N concentrations in well MW-2R have decreased to below the NMED standard. The excavation was not effective at reducing nitrate concentrations in well MW-3.

The nitrate-N concentrations during the most recent August 2019 sampling event are shown on **Figure 5**. Graphs depicting nitrate-N concentrations and depth to groundwater over time are included as **Appendix A**.

5.0 PROPOSED ABATEMENT PLAN MODIFICATION

Based on the improved groundwater quality in the vicinity of well MW-2R following the 2015 injections, the Stage 2 Abatement Plan will be modified to include injections upgradient of wells MW-1, MW-3, and MW-5 where nitrate-N concentrations exceed background levels. Additionally, wells MW-1, MW-3, and MW-5 will be destroyed and replaced by wells with 20-foot screen intervals to account for the proposed injection interval. The proposed replacement well and injection locations are shown on **Figure 6**.

5.1 Permitting

Permits for the injection borings and monitoring wells will be obtained from the New Mexico Office of the State Engineer (NMSE) prior to field activities. The NMED and NMSE will be notified at least 48 hours prior to field activities. In accordance with NMAC 20.6.2.1201, a Notice of Intent (NOI) to perform groundwater injections will be submitted to the NMED for approval and a discharge permit will be obtained prior to field activities.

5.2 Public Notice

Public notice of the Stage 2 Abatement Plan Modification will be performed in accordance with NMAC 20.6.2.4108.

5.3 Health and Safety

A site-specific Health and Safety Plan (HASP) will be reviewed and signed by all field personnel, including subcontractors, prior to work initiation. The HASP will identify potential health and safety hazards for each phase of site work and include requirements and procedures for protection. The HASP will be maintained onsite during the field activities.

5.4 Utility Clearance

New Mexico 811 will be notified at least 48 hours in advance of subsurface activities to identify underground utilities. A private utility locator will also perform a geophysical survey in the vicinity of each drilling location to identify potential underground utilities or other subsurface obstructions. If necessary, a hand auger will be advanced to 5 feet bgs before drilling to manually clear the location.

5.5 Monitoring Well Replacement

5.5.1 Well Destruction

Wells MW-1, MW-3 and MW-5 will be destroyed in accordance with NMSE requirements. The wells will be destroyed by removing the concrete well pad and over drilling the well casing to 1-foot below the installed depth. The boring will be tremie grouted with neat cement to approximately 5 feet bgs. The remaining annulus will be filled with native soil obtained onsite.

5.5.2 Replacement Well Construction

Wells MW-1R, MW-3R, and MW-5R will be constructed of 2-inch diameter Schedule 40 PVC casing with 20 feet of 0.010-inch slotted screen installed between 20 and 40 feet bgs. The wells will be installed approximately 10 feet away from the wells they are replacing at the locations shown on **Figure 6** using a truck-mounted hollow stem auger drilling rig. During drilling, soil cores will be collected every 5 feet and logged in the field using the Unified Soil Classification System. After reaching the maximum extent of drilling (40 feet bgs), the augers will be removed in stages as the annular space will be backfilled as described below.

The annular space between the borehole wall and the well screen in all wells will be backfilled with a silica sand filter pack to approximately 2 feet above the top of the well screen. A 2-foot thick hydrated bentonite pellet seal will be installed above the filter pack. A neat cement sanitary seal will extend from the top of the bentonite seal to approximately 1 feet bgs. The wells will be completed with a flush-mounted traffic-rated well box and the remaining annular space will be backfilled with the concrete for the well pad.

5.5.3 Well Development

The replacement wells will be developed a minimum of 48 hours after installation by a combination of bailing, surging, and pumping. The total well depth, depth to water, temperature, pH, specific conductance, dissolved oxygen, and oxygen reduction potential will be measured prior to, and periodically during, development. Development will continue until a minimum of five casing volumes of water have been removed and water quality parameters have stabilized.

5.5.4 Well Survey

The location, ground surface elevation, and top of casing elevation of each replacement well will be measured by a New Mexico-licensed Professional Land Surveyor.

5.6 Injection Solution

The injection solution will consist of water and Lactoil®, which is manufactured by JRW Bioremediation, LLC. Lactoil is comprised of fermentable carbon sources that stimulate microbial growth, which results in depletion of dissolved oxygen and lowering of the oxidation reduction potential in groundwater. As the system becomes more anaerobic, denitrifying bacteria will use nitrate as the electron acceptor and should reduce nitrate concentrations in the groundwater. The product information sheet for Lactoil is included as **Appendix B**.

5.7 Injection Method

The injections will be performed in the groundwater upgradient of wells MW-1R, MW-3R, and MW-5R at the locations shown on **Figure 6**. The temporary injection points will be constructed using a truck-mounted direct push drilling rig. The drilling rods will be advanced to approximately 25 feet bgs, and the rods will be retracted to expose a 5-foot screen. The solution will be injected into the subsurface through the drilling rods and screen. After completing injections into the first depth interval (20 to 25 feet bgs), injections will be performed in 5-foot intervals to a maximum depth of 40 feet bgs. After the injections are completed, the borings will be tremie-grouted with neat cement through the drilling rods to the approximately 5 feet bgs. The remaining annulus will be filled with native soil obtained onsite.

Based on the COC concentrations in groundwater and underlying hydrogeology, 2,610 pounds (330 gallons) of Lactoil will be injected. The Lactoil will be mixed with 3,000 gallons of water to create an approximate 10% solution and a total of 3,330 gallons. The solution will be injected into each area as described below:

- MW-1R – 3 borings – 444 gallons total (37 gallons per 5-foot interval)
- MW-3R – 6 borings – 1,110 gallons total (74 gallons per 5-foot interval)
- MW-5R – 5 borings – 1,110 gallons total (55.5 gallons per 5-foot interval)

The solution will be injected into each boring at flow rates up to 5 gallons per minute. If needed, low pressure (up to 40 pounds per square inch) will be applied using a specialized well cap and air compressor to ensure maximum distribution of the substrate to the subsurface without creating preferential flow pathways or flow up the drilling rods.

5.8 Decontamination and Waste Management

Down-hole drilling equipment will be decontaminated prior to drilling each boring using high-pressure cleaning equipment. The decontamination rinsate generated during drilling will be placed into 55-gallon United States Department of Transportation approved drums. The drums will be labeled, dated, and staged on site prior to characterization and disposal at an appropriate off-site facility.

6.0 GROUNDWATER MONITORING AND SAMPLING PROGRAM

6.1 Schedule and Frequency

Baseline groundwater samples will be collected from the monitoring well network prior to the injection event. Post-injection samples will be collected on a quarterly basis for two years.

6.2 Groundwater Sampling and Analysis

The depth to water and total well depth will be gauged in the wells prior to purging and sampling. The wells will be purged and sampled in accordance with the low flow protocols (Environmental Protection Agency [EPA], 2002). Temperature, pH, specific conductance, dissolved oxygen, and oxidation reduction potential will be measured periodically during purging and recorded on field sheets. After the parameters stabilize, the low-flow pump and dedicated tubing will be used to collect the sample from a discrete point within the saturated screened interval of the well into laboratory-supplied containers.

The groundwater samples will be immediately labeled, sealed in a plastic bag, logged on the Chain of Custody, transferred to a cooler maintained at approximately 4°Celsius, and submitted to the laboratory. The samples will be analyzed for nitrate-N + nitrite-N by EPA method 353.2, and for parameters to evaluate denitrification conditions including total organic carbon by EPA method 5310, chloride and sulfate by EPA method 300.0, and iron and manganese by EPA method 6010.

7.0 SCHEDULING AND REPORTING

Field activities will be initiated after receiving the NMED's authorization to proceed, securing the permits, submitting a NOI, and notifying the public. A Stage 2 Abatement Summary Report will be submitted to the NMED after completing the field activities. At a minimum, the report will contain:

- Copies of the approved permits and documentation of public notification(s);
- Field notes from the baseline groundwater sampling event;
- Figures and tables summarizing the baseline groundwater analytical results;
- Laboratory analytical report(s), and
- Descriptions of the injection methods and volumes.

The post-injection groundwater sampling results will be reported in subsequent quarterly groundwater monitoring and sampling reports for the site.

8.0 REFERENCES

Rubik. 2015. Stage 2 Abatement Status and 2016 First Semi-Annual Groundwater Monitoring Report, Former Agrilience Facility, 103 East Mill Road, Artesia, New Mexico. October 9.

Terracon, 2009. Assessment Activities and Proposed Groundwater Monitoring, Agrilience LLC, 103 East Mill Road, Artesia, New Mexico. February 17.

FIGURES

STAGE 2 ABATEMENT PLAN MODIFICATION

Nutrien Ag Solution, Inc.
Artesia, New Mexico

February 2020



STAGE 2 ABATEMENT PLAN MODIFICATION

Nutrien Ag Solutions, Inc.
Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

February 3, 2020

Submitted to:

Paul Chamberlain
New Mexico Environmental Department
Remediation Oversight Section
1190 S. Saint Francis Drive
Santa Fe, New Mexico 87505

Prepared for:

Nutrien Ag Solutions, Inc.
5296 Harvest Lake Drive
Loveland, Colorado 80538

Prepared by:

Rubik
320 Flint Street
Reno, Nevada 89501

Reviewed by:

Todd Leonard
Principal

Prepared and Approved by:

Stephen A. Meninger, PG
Senior Geologist

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APPENDICES

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Appendix B	Injection Product Information Sheet

1.0 INTRODUCTION

On behalf of Nutrien Ag Solutions, Inc. (Nutrien), Rubik developed this Stage 2 Abatement Plan Modification for the former Agrilience facility located at 103 East Mill Road in Artesia, New Mexico (**Figure 1**). The plan modification was proposed by Nutrien in an October 10, 2019 meeting with the New Mexico Environmental Department (NMED) and was developed in accordance with New Mexico Administrative Code (NMAC) Section 20.6.2.4000.

1.1 Objective

The objective of this project is to reduce nitrate concentrations in the groundwater.

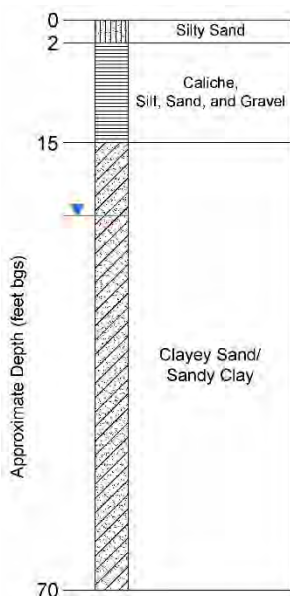
2.0 SITE DESCRIPTION

The facility has operated as a retail distribution of bulk dry and liquid fertilizers since the mid-1990s. The current and former site features are depicted on **Figure 2**.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Geology

The geology beneath the site is summarized below:



Historical soil boring locations and a geologic cross section path are shown on **Figure 3** and the geologic cross section is presented as **Figure 4**.

3.2 Hydrogeology

In August 2019, the depth to groundwater beneath the site was approximately 25 feet below the ground surface (bgs). Groundwater elevations have declined approximately 10 feet since 2017. Groundwater beneath the site generally flows to the southeast at 0.005 feet/foot. Well construction details are summarized in **Table 1** and historical groundwater elevations are summarized in **Tables 2** through **4**.

4.0 ABATEMENT HISTORY

In 2008, soil samples were collected across the site and nitrate as nitrogen (-N) concentrations exceeded the current NMED soil screening level of 425 milligrams per kilogram (mg/kg) at 1-foot bgs near the fertilizer storage areas, load pads, and above ground storage (AST) containment (Terracon, 2009). The concentrations generally attenuated with depth and did not exceed the standard at 4 feet bgs, except near the fertilizer storage areas. Historical soil sampling locations are shown on **Figure 3** and analytical results are summarized in **Table 5**.

Groundwater monitoring and sampling began at the site in 2009 and nitrate-N concentrations have continued to exceed the NMED standard of 10 milligrams per liter (mg/L). Monitoring well locations are shown on **Figure 2** and historical groundwater monitoring and sampling data is summarized on **Tables 2** through **4**.

In 2010, the facility was upgraded with secondary concrete containment for the ASTs and larger load pads in the fertilizer storage areas.

In 2015, well MW-2 was replaced due to decreasing groundwater elevations and to have a monitoring well screened over the same interval as the injections. A solution of Lactoil and water was injected upgradient of well MW-2R to decrease nitrate-N concentrations in groundwater (Rubik, 2015). Soil near well MW-3 was excavated to between 4 and 8 feet bgs to the extent possible based on the locations of structures, underground utilities, and railroad tracks. Since the injections, nitrate-N concentrations in well MW-2R have decreased to below the NMED standard. The excavation was not effective at reducing nitrate concentrations in well MW-3.

The nitrate-N concentrations during the most recent August 2019 sampling event are shown on **Figure 5**. Graphs depicting nitrate-N concentrations and depth to groundwater over time are included as **Appendix A**.

5.0 PROPOSED ABATEMENT PLAN MODIFICATION

Based on the improved groundwater quality in the vicinity of well MW-2R following the 2015 injections, the Stage 2 Abatement Plan will be modified to include injections upgradient of wells MW-1, MW-3, and MW-5 where nitrate-N concentrations exceed background levels. Additionally, wells MW-1, MW-3, and MW-5 will be destroyed and replaced by wells with 20-foot screen intervals to account for the proposed injection interval. The proposed replacement well and injection locations are shown on **Figure 6**.

5.1 Permitting

Permits for the injection borings and monitoring wells will be obtained from the New Mexico Office of the State Engineer (NMSE) prior to field activities. The NMED and NMSE will be notified at least 48 hours prior to field activities. In accordance with NMAC 20.6.2.1201, a Notice of Intent (NOI) to perform groundwater injections will be submitted to the NMED for approval and a discharge permit will be obtained prior to field activities.

5.2 Public Notice

Public notice of the Stage 2 Abatement Plan Modification will be performed in accordance with NMAC 20.6.2.4108.

5.3 Health and Safety

A site-specific Health and Safety Plan (HASP) will be reviewed and signed by all field personnel, including subcontractors, prior to work initiation. The HASP will identify potential health and safety hazards for each phase of site work and include requirements and procedures for protection. The HASP will be maintained onsite during the field activities.

5.4 Utility Clearance

New Mexico 811 will be notified at least 48 hours in advance of subsurface activities to identify underground utilities. A private utility locator will also perform a geophysical survey in the vicinity of each drilling location to identify potential underground utilities or other subsurface obstructions. If necessary, a hand auger will be advanced to 5 feet bgs before drilling to manually clear the location.

5.5 Monitoring Well Replacement

5.5.1 Well Destruction

Wells MW-1, MW-3 and MW-5 will be destroyed in accordance with NMSE requirements. The wells will be destroyed by removing the concrete well pad and over drilling the well casing to 1-foot below the installed depth. The boring will be tremie grouted with neat cement to approximately 5 feet bgs. The remaining annulus will be filled with native soil obtained onsite.

5.5.2 Replacement Well Construction

Wells MW-1R, MW-3R, and MW-5R will be constructed of 2-inch diameter Schedule 40 PVC casing with 20 feet of 0.010-inch slotted screen installed between 20 and 40 feet bgs. The wells will be installed approximately 10 feet away from the wells they are replacing at the locations shown on **Figure 6** using a truck-mounted hollow stem auger drilling rig. During drilling, soil cores will be collected every 5 feet and logged in the field using the Unified Soil Classification System. After reaching the maximum extent of drilling (40 feet bgs), the augers will be removed in stages as the annular space will be backfilled as described below.

The annular space between the borehole wall and the well screen in all wells will be backfilled with a silica sand filter pack to approximately 2 feet above the top of the well screen. A 2-foot thick hydrated bentonite pellet seal will be installed above the filter pack. A neat cement sanitary seal will extend from the top of the bentonite seal to approximately 1 feet bgs. The wells will be completed with a flush-mounted traffic-rated well box and the remaining annular space will be backfilled with the concrete for the well pad.

5.5.3 Well Development

The replacement wells will be developed a minimum of 48 hours after installation by a combination of bailing, surging, and pumping. The total well depth, depth to water, temperature, pH, specific conductance, dissolved oxygen, and oxygen reduction potential will be measured prior to, and periodically during, development. Development will continue until a minimum of five casing volumes of water have been removed and water quality parameters have stabilized.

5.5.4 Well Survey

The location, ground surface elevation, and top of casing elevation of each replacement well will be measured by a New Mexico-licensed Professional Land Surveyor.

5.6 Injection Solution

The injection solution will consist of water and Lactoil®, which is manufactured by JRW Bioremediation, LLC. Lactoil is comprised of fermentable carbon sources that stimulate microbial growth, which results in depletion of dissolved oxygen and lowering of the oxidation reduction potential in groundwater. As the system becomes more anaerobic, denitrifying bacteria will use nitrate as the electron acceptor and should reduce nitrate concentrations in the groundwater. The product information sheet for Lactoil is included as **Appendix B**.

5.7 Injection Method

The injections will be performed in the groundwater upgradient of wells MW-1R, MW-3R, and MW-5R at the locations shown on **Figure 6**. The temporary injection points will be constructed using a truck-mounted direct push drilling rig. The drilling rods will be advanced to approximately 25 feet bgs, and the rods will be retracted to expose a 5-foot screen. The solution will be injected into the subsurface through the drilling rods and screen. After completing injections into the first depth interval (20 to 25 feet bgs), injections will be performed in 5-foot intervals to a maximum depth of 40 feet bgs. After the injections are completed, the borings will be tremie-grouted with neat cement through the drilling rods to the approximately 5 feet bgs. The remaining annulus will be filled with native soil obtained onsite.

Based on the COC concentrations in groundwater and underlying hydrogeology, 2,610 pounds (330 gallons) of Lactoil will be injected. The Lactoil will be mixed with 3,000 gallons of water to create an approximate 10% solution and a total of 3,330 gallons. The solution will be injected into each area as described below:

- MW-1R – 3 borings – 444 gallons total (37 gallons per 5-foot interval)
- MW-3R – 6 borings – 1,110 gallons total (74 gallons per 5-foot interval)
- MW-5R – 5 borings – 1,110 gallons total (55.5 gallons per 5-foot interval)

The solution will be injected into each boring at flow rates up to 5 gallons per minute. If needed, low pressure (up to 40 pounds per square inch) will be applied using a specialized well cap and air compressor to ensure maximum distribution of the substrate to the subsurface without creating preferential flow pathways or flow up the drilling rods.

5.8 Decontamination and Waste Management

Down-hole drilling equipment will be decontaminated prior to drilling each boring using high-pressure cleaning equipment. The decontamination rinsate generated during drilling will be placed into 55-gallon United States Department of Transportation approved drums. The drums will be labeled, dated, and staged on site prior to characterization and disposal at an appropriate off-site facility.

6.0 GROUNDWATER MONITORING AND SAMPLING PROGRAM

6.1 Schedule and Frequency

Baseline groundwater samples will be collected from the monitoring well network prior to the injection event. Post-injection samples will be collected on a quarterly basis for two years.

6.2 Groundwater Sampling and Analysis

The depth to water and total well depth will be gauged in the wells prior to purging and sampling. The wells will be purged and sampled in accordance with the low flow protocols (Environmental Protection Agency [EPA], 2002). Temperature, pH, specific conductance, dissolved oxygen, and oxidation reduction potential will be measured periodically during purging and recorded on field sheets. After the parameters stabilize, the low-flow pump and dedicated tubing will be used to collect the sample from a discrete point within the saturated screened interval of the well into laboratory-supplied containers.

The groundwater samples will be immediately labeled, sealed in a plastic bag, logged on the Chain of Custody, transferred to a cooler maintained at approximately 4°Celsius, and submitted to the laboratory. The samples will be analyzed for nitrate-N + nitrite-N by EPA method 353.2, and for parameters to evaluate denitrification conditions including total organic carbon by EPA method 5310, chloride and sulfate by EPA method 300.0, and iron and manganese by EPA method 6010.

7.0 SCHEDULING AND REPORTING

Field activities will be initiated after receiving the NMED's authorization to proceed, securing the permits, submitting a NOI, and notifying the public. A Stage 2 Abatement Summary Report will be submitted to the NMED after completing the field activities. At a minimum, the report will contain:

- Copies of the approved permits and documentation of public notification(s);
- Field notes from the baseline groundwater sampling event;
- Figures and tables summarizing the baseline groundwater analytical results;
- Laboratory analytical report(s), and
- Descriptions of the injection methods and volumes.

The post-injection groundwater sampling results will be reported in subsequent quarterly groundwater monitoring and sampling reports for the site.

8.0 REFERENCES

Rubik. 2015. Stage 2 Abatement Status and 2016 First Semi-Annual Groundwater Monitoring Report, Former Agrilience Facility, 103 East Mill Road, Artesia, New Mexico. October 9.

Terracon, 2009. Assessment Activities and Proposed Groundwater Monitoring, Agrilience LLC, 103 East Mill Road, Artesia, New Mexico. February 17.

FIGURES

STAGE 2 ABATEMENT PLAN MODIFICATION

Nutrien Ag Solution, Inc.
Artesia, New Mexico

February 2020



320 Flint Street
Reno, Nevada 89501
(775) 622-0857

VICINITY MAP

**FORMER AGRILIENCE FACILITY
103 EAST MILL ROAD
ARTESIA, NEW MEXICO**

DESIGNED BY: SPF	DETAILED BY: SPF	CHECKED BY: SAM
DATE: 12/18/2019	ACAD FILE: 20191218 RBK Artesia NM Fig 1 Vic Map.dwg	
PROJECT NO.: 03002-2019	PLOT SCALE: Approx. 1" = 1,500'	

FIGURE 1



LEGEND

- MW-1 ● MONITORING WELL
 MW-2 ● ABANDONED MONITORING WELL
 [Blue Hatched Box] 2015 INJECTION AREA
 [Purple Dotted Box] 2015 EXCAVATION AREA

- ABOVE GROUND STORAGE TANK (AST)
 ○ FORMER AST
 [Dashed Line] APPROXIMATE SITE BOUNDARY
 [Stippled Box] CONCRETE
 - x - FENCE
 +++ RAILROAD TRACKS

0 80' 160'



1 inch = Approximately 80'

Map Data: Google (Imagery Date: March 12, 2016)



320 Flint Street
 Reno, Nevada 89501
 (775) 622-0857

SITE MAP

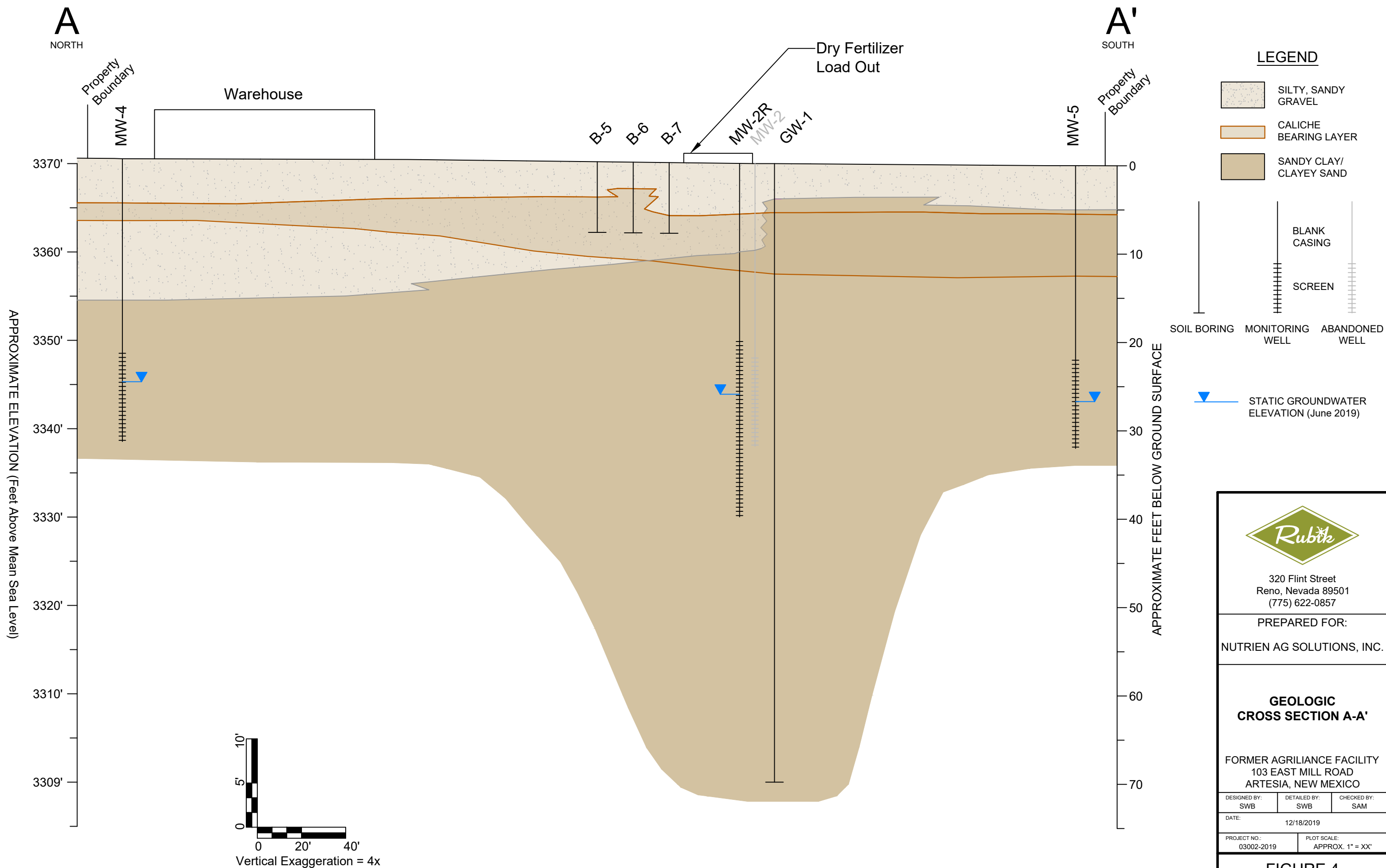
FORMER AGRILIANCE FACILITY
103 EAST MILL ROAD
ARTESIA, NEW MEXICO

DESIGNED BY: SPF	DETAILED BY: CW	CHECKED BY: SAM
DATE: 12/18/2019	ACAD FILE: 20191218 RBK Artesia NM Fig 2 Site Plan.dwg	
PROJECT NO.: 03002-2019	PLOT SCALE: APPROX. 1" = 80'	

FIGURE 2



**FORMER AGRILIANCE FACILITY
103 EAST MILL ROAD
ARTESIA, NEW MEXICO**





LEGEND

- MW-1 MONITORING WELL
 MW-2 ABANDONED MONITORING WELL
 [12] TON (mg/L) - June 2019
 TON = Nitrate-N + Nitrite-N
 [16/17] Primary / Duplicate sample result

- APPROXIMATE SITE BOUNDARY
 CONCRETE
 2015 INJECTION AREA
 2015 EXCAVATION AREA

- ABOVE GROUND STORAGE TANK (AST)
 FORMER AST
 FENCE
 RAILROAD TRACKS

0 80' 160'

1 inch = Approximately 80'

Map Data: Google (Imagery Date: March 12, 2016)



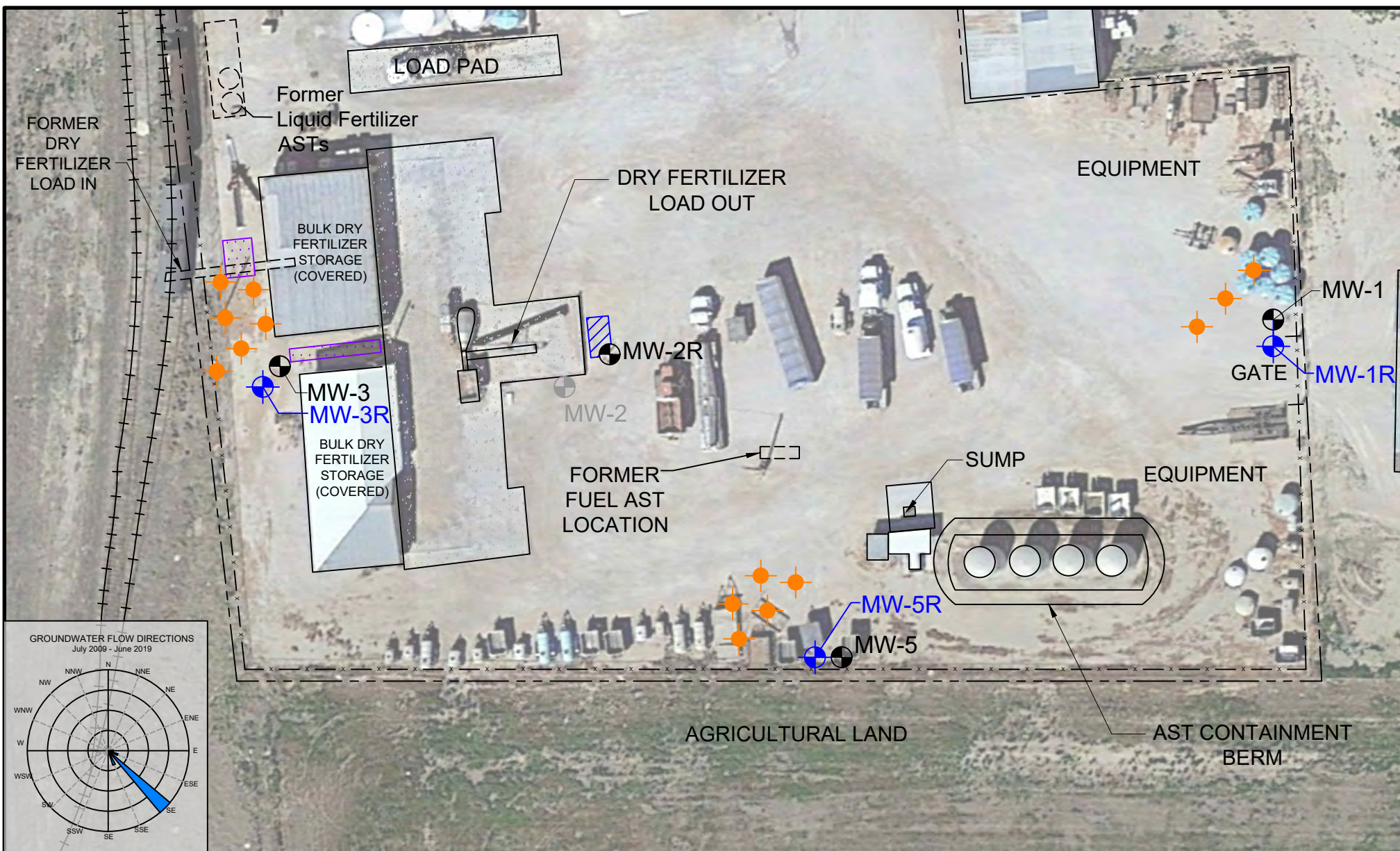
320 Flint Street
 Reno, Nevada 89501
 (775) 622-0857

GROUNDWATER ANALYTICAL RESULTS JUNE 2019

FORMER AGRILIANCE FACILITY
 103 EAST MILL ROAD
 ARTESIA, NEW MEXICO

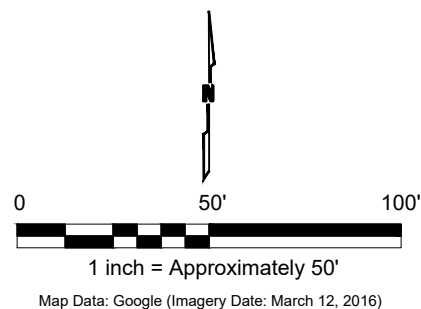
DESIGNED BY: SPF	DETAILED BY: SPF	CHECKED BY: SAM
DATE: 1/10/2020	ACAD FILE: 20191218 RBK Artesia NM Fig 5 GW TON.dwg	
PROJECT NO.: 03002-2019	PLOT SCALE: APPROX. 1" = 80'	

FIGURE 5



LEGEND

- | | | | |
|------|---------------------------------|--|---------------------------|
| MW-1 | MONITORING WELL | | 2015 INJECTION AREA |
| MW-2 | ABANDONED MONITORING WELL | | 2015 EXCAVATION AREA |
| | PROPOSED INJECTION LOCATION | | APPROXIMATE SITE BOUNDARY |
| | PROPOSED MONITORING WELL | | CONCRETE |
| | ABOVE GROUND STORAGE TANK (AST) | | FENCE |
| | FORMER AST | | RAILROAD TRACKS |



320 Flint Street
Reno, Nevada 89501
(775) 622-0857

PROPOSED INJECTION LOCATIONS

FORMER AGRILIANCE FACILITY
103 EAST MILL ROAD
ARTESIA, NEW MEXICO

DESIGNED BY: SPF	DETAILED BY: SPF	CHECKED BY: SAM
DATE: 12/18/2019		
PROJECT NO.: 03002-2019	PLOT SCALE: APPROX. 1" = 50'	

FIGURE 6

TABLES

STAGE 2 ABATEMENT PLAN MODIFICATION

Nutrien Ag Solution, Inc.
Artesia, New Mexico

February 2020

TABLE 1
MONITORING WELL CONSTRUCTION DETAILS

Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

Well ID	Installation Date	Well Diameter (inches)	Top of Well Casing Elevation (feet amsl)	Above Ground Casing Length (feet)	Well Depth (feet bgs)	Screen Interval (feet bgs)	
						Top	Bottom
MW-1	07/02/09	2	3372.99	3.0	32	22	32
MW-2	07/02/09	2	3373.09	3.0	32	22	32
MW-2R	03/13/15	2	3373.30	2.9	40	20	40
MW-3	07/02/09	2	3373.91	3.0	32	22	32
MW-4	07/02/09	2	3373.55	3.0	32	22	32
MW-5	10/08/13	2	3372.77	2.5	32	22	32

Notes

amsl = above mean sea level

btc = below top of casing

bgs = below ground surface

Gray = well destroyed

TABLE 2
HISTORICAL GROUNDWATER ELEVATION AND ANALYTICAL DATA

Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

Well ID (feet amsl)	Date	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Water Column Length (feet)	Groundwater Elevation (feet amsl)	TON (mg/L)
Background Concentration*/New Mexico WQCC Ground Water Standard =						18/10
MW-1 3372.99	07/10/09	27.38	24.38	11	3345.61	--
	07/22/09	27.62	24.62	11	3345.37	23
	10/09/09	25.91	22.91	13	3347.08	22
	03/12/10	26.74	23.74	12	3346.25	23
	06/29/10	27.63	24.63	11	3345.36	24
	09/27/10	--	--	--	--	22
	11/09/10	25.24	22.24	14	3347.75	--
	12/22/10	26.67	23.67	12	3346.32	23
	03/23/11	28.01	25.01	11	3344.98	24
	06/22/11	28.67	25.67	10	3344.32	21
	01/05/12	30.02	27.02	9	3342.97	24
	09/20/12	27.40	24.40	11	3345.59	22.6
	12/03/12	29.03	26.03	10	3343.96	18
	06/19/13	30.95	27.95	8	3342.04	16
	12/04/13	30.24	27.24	9	3342.75	20
	05/28/14	32.10	29.10	7	3340.89	16
	5/28/14 D	--	--	--	--	17
	12/02/14	24.62	21.62	14	3348.37	20
	06/29/15	26.15	23.15	13	3346.84	21
	12/15/15	23.62	20.62	15	3349.37	19
	12/15/15 D	--	--	--	--	19
	06/14/16	24.31	21.31	14	3348.68	22
	12/12/16	19.20	16.20	20	3353.79	17
	06/19/17	21.77	18.77	17	3351.22	21
	06/11/18	26.00	23.00	13	3346.99	22
	06/25/19	28.96	25.96	10	3344.03	12
MW-2 3373.09	07/10/09	27.19	24.19	--	3345.90	--
	07/22/09	26.98	23.98	--	3346.11	110
	10/09/09	24.76	21.76	--	3348.33	96
	03/12/10	26.24	23.24	--	3346.85	90
	06/29/10	27.16	24.16	--	3345.93	87
	09/27/10	--	--	--	--	78
	11/09/10	25.31	22.31	--	3347.78	--
	12/22/10	26.53	23.53	--	3346.56	82
	03/23/11	27.68	24.68	--	3345.41	78
	06/22/11	28.10	25.10	--	3344.99	72
	01/05/12	29.67	26.67	--	3343.42	76
	09/20/12	27.38	24.38	--	3345.71	64.5
	09/20/12 D	--	--	--	--	69
	12/03/12	29.50	26.50	--	3343.59	67.9
	12/03/12 D	--	--	--	--	68
	06/19/13	30.68	27.68	--	3342.41	61
	6/19/13 D	--	--	--	--	58
	12/04/13	29.72	26.72	--	3343.37	57
	12/04/13 D	--	--	--	--	59
	05/28/14	31.99	28.99	--	3341.10	60
	12/02/14	23.39	20.39	--	3349.70	90
MW-2R 3373.30	03/14/15	25.35	22.45	21	3347.95	42
	06/29/15	26.33	23.43	20	3346.97	3.2
	12/15/15	23.17	20.27	23	3350.13	0.060
	03/22/16	23.41	20.55	23	3349.89	<0.020

TABLE 2
HISTORICAL GROUNDWATER ELEVATION AND ANALYTICAL DATA

Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

Well ID (feet amsl)	Date	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Water Column Length (feet)	Groundwater Elevation (feet amsl)	TON (mg/L)
Background Concentration*/New Mexico WQCC Ground Water Standard =						18/10
MW-2R (cont.)	06/14/16	24.57	21.71	22	3348.73	0.022
	6/14/16 D	--	--	--	--	0.029
	12/12/16	18.53	15.67	28	3354.77	1.1
	12/12/16 D	--	--	--	--	1.7
	06/19/17	21.52	18.66	25	3351.78	1.0
	06/11/18	25.92	23.06	20	3347.38	0.25
	06/11/18 D	--	--	--	--	0.67
	06/25/19	28.98	26.12	17	3344.32	<0.020
	06/25/19 D	--	--	--	--	<0.020
MW-3 3373.91	07/10/09	27.35	24.35	11	3346.56	--
	07/22/09	27.08	24.08	11	3346.83	37
	10/09/09	24.56	21.56	14	3349.35	32
	03/12/10	26.37	23.37	12	3347.54	22
	06/29/10	27.37	24.37	11	3346.54	22
	09/27/10	--	--	--	--	21
	11/09/10	25.67	22.67	13	3348.24	--
	12/22/10	26.83	23.83	11	3347.08	29
	03/23/11	27.96	24.96	10	3345.95	46
	06/22/11	28.15	25.15	10	3345.76	39
	01/05/12	29.80	26.80	8	3344.11	20
	09/20/12	27.66	24.66	11	3346.25	16.6
	12/03/12	29.27	26.27	9	3344.64	15.4
	06/19/13	31.31	28.31	7	3342.60	15
	12/04/13	30.08	27.08	8	3343.83	19
	05/28/14	32.26	29.26	6	3341.65	18
	12/02/14	22.93	19.93	15	3350.98	31
	06/29/15	26.33	23.33	12	3347.58	97
	6/29/2015 D	--	--	--	--	53
	12/15/15	22.49	19.49	16	3351.42	68
	06/14/16	24.53	21.53	14	3349.38	100
	12/12/16	17.98	14.98	20	3355.93	61
	06/19/17	21.38	18.38	17	3352.53	93
	06/19/17 D	--	--	--	--	93
	06/11/18	25.79	22.79	12	3348.12	180
	06/25/19	29.07	26.07	9	3344.84	230
MW-4 3373.55	07/10/09	27.48	24.48	11	3346.07	--
	07/22/09	27.67	24.67	11	3345.88	14
	10/09/09	25.29	22.29	13	3348.26	13
	03/12/10	25.96	22.96	12	3347.59	14
	06/29/10	27.06	24.06	11	3346.49	15
	09/27/10	--	--	--	--	18
	11/09/10	25.25	22.25	13	3348.30	--
	12/22/10	25.75	22.75	12	3347.80	17
	03/23/11	27.42	24.42	11	3346.13	16
	06/22/11	28.06	25.06	10	3345.49	15
	01/05/12	29.41	26.41	9	3344.14	18
	09/20/12	27.40	24.40	11	3346.15	16.6
	12/03/12	28.75	25.75	9	3344.80	15.7
	06/19/13	30.89	27.89	7	3342.66	16
	12/04/13	28.83	25.83	9	3344.72	17

TABLE 2
HISTORICAL GROUNDWATER ELEVATION AND ANALYTICAL DATA

Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

Well ID (feet amsl)	Date	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Water Column Length (feet)	Groundwater Elevation (feet amsl)	TON (mg/L)
Background Concentration*/New Mexico WQCC Ground Water Standard =						18/10
MW-4 (cont.)	05/28/14	31.02	28.02	7	3342.53	17
	12/02/14	23.33	20.33	15	3350.22	20
	06/29/15	25.21	22.21	13	3348.34	21
	12/15/15	22.75	19.75	15	3350.80	18
	06/14/16	23.80	20.80	14	3349.75	19
	12/12/16	18.46	15.46	20	3355.09	18
	06/19/17	20.85	17.85	17	3352.70	17
	06/11/18	25.10	22.10	13	3348.45	18
	06/25/19	28.23	25.23	10	3345.32	14
MW-5 3372.77	10/08/13	30.31	27.81	8	3342.46	13
	12/04/13	30.53	28.03	7	3342.24	12
	05/28/14	32.28	29.78	6	3340.49	12
	12/02/14	24.11	21.61	14	3348.66	45
	12/02/14 D	--	--	--	--	46
	06/29/15	26.58	24.08	11	3346.19	44
	12/15/15	23.47	20.97	15	3349.30	37
	06/14/16	24.64	22.11	13	3348.13	39
	12/12/16	18.69	16.16	19	3354.08	26
	06/19/17			Well inaccessible		
	06/11/18	26.10	23.57	12	3346.67	33
	06/25/19	29.23	26.70	9	3343.54	27

Notes:

btoc = below top of casing

bgs = feet below ground surface

amsl = feet above mean sea level

mg/L = Milligrams per liter

-- = Not measured or not analyzed

D = Duplicate sample

WQCC = New Mexico Water Quality Control Commission

TON = Nitrate+Nitrite as Nitrogen by EPA Method 353.2

* = TON background concentration was established using the 95% UCL for data collected between 2009 and 2019 from upgradient well MW-4.

TABLE 3
MW-2R LACTOIL INJECTION MONITORING SUMMARY

Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

Date	Depth to Water (feet btoc)	Water Column Lengt (feet)	TON (mg/L)	TOC (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Temp (°C)	pH	Field Parameters		
									Conductivity (µs/cm)	Oxygen Reducing Potential (mV)	Dissolved Oxygen (mg/L)
3/14/2015*	25.35	21	42	3.7	500	3,600	18.2	6.98	6,232	306.6	6.50
6/29/2015	26.33	20	3.2	24,000	340	2,100	27.1	5.87	8,208	-301.4	1.36
12/15/2015	23.17	23	0.060	7,400	410	390	18.1	4.33	7,281	-156.9	17.8
3/22/2016	23.41	23	<0.020	7,200	400	540	18.7	6.24	7,303	-3.2	16.2
6/14/2016	24.57	22	0.022	1,900	420	6.3	21.4	6.82	6,278	-28.1	1.45
12/12/2016	18.53	28	1.1	780	470	140	19.79	7.55	5,156	-159.6	0.82
6/19/2017	21.52	25	1.0	220	570	150	21.20	6.79	6,279	-28.3	1.63
6/11/2018	25.92	20	0.25	180	--	--	24.2	6.91	5,269	-156.0	3.87
6/25/2019	28.98	17	<0.020	200	--	--	21.1	6.91	4,317	-95.6	2.02

Notes

- btoc = below top of casing
- TOC = Total Organic Carbon by EPA Method 5310C
- TON = Total Oxidized Nitrogen (Nitrate + Nitrite as Nitrogen) by EPA Method 353.2
- Chloride and Sulfate analyzed by EPA Method 300.0 or A4500
- = Not analyzed or measured
- mg/L = Milligrams per liter
- us/cm = microsemens per centimeter
- mV = millivolts
- * = pre-injection sampling

TABLE 4
HISTORICAL GROUNDWATER ANALYTICAL DATA - ADDITIONAL COMPOUNDS

Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

Well ID	Date	Nitrogen Compounds (mg/L)		TOC (mg/L)	TDS (mg/L)	Metals (mg/L)						Inorganic Ions (mg/L)			Alkalinity (mg/L)		
		Ammonia-N	TKN			Calcium	Sodium	Potassium	Iron	Manganese	Magnesium	Chloride	Fluoride	Sulfate	Carbonate (as CaCO3)	Bicarbonate (as CaCO3)	Total Alkalinity (as CaCO3)
MW-1	12/4/2013	<0.020	<1.0	--	7,100	500	760	1.7 J	3.1	0.041	680	230	4.2	5,100	<10	210	210
	12/2/2014	--	--	--	7,100	--	--	--	2.1	0.020 J	--	200	4.7	5,100	--	--	--
	6/29/2015	--	--	--	7,100	--	--	--	0.51	0.0096	--	200	7.2	5,000	--	--	--
	12/15/2015	--	--	--	7,000	--	--	--	--	--	--	230	2.6	4,600	--	--	--
	12/15/2015 D	--	--	--	7,000	--	--	--	--	--	--	230	2.7	4,200	--	--	--
MW-2	12/4/2013	<0.020	<1.0	--	6,600	730	490	2.0 J	6.4	0.26	620	570	3.0	3,700	<10	270	270
	12/4/2013 D	<0.020	<1.0	--	6,300	710	490	2.6	4.1	0.22	610	590	3.1	3,800	<10	280	280
	12/2/2014	--	--	--	6,700	--	--	--	1.2	0.12	--	610	2.5	3,700	--	--	--
MW-2R	3/14/2015	--	--	3.7	--	--	--	--	--	--	--	500	--	3,600	--	--	--
	6/29/2015	--	--	24,000	13,000	--	--	--	20	34	--	340	<5.0	2,100	--	--	--
	12/15/2015	--	--	7,400	12,000	--	--	--	--	--	--	410	<5.0	390	--	--	--
	3/22/2016	--	--	7,200	11,000	--	--	--	--	--	--	400	<0.50	540	--	--	--
	6/14/2016	--	--	1,900	5,900	--	--	--	--	--	--	420	--	6.3	--	--	--
	6/14/2016 D	--	--	1,900	6,100	--	--	--	--	--	--	430	--	27	--	--	--
	12/12/2016	--	--	780	3,900	--	--	--	--	--	--	470	--	140	--	--	--
	12/12/2016 D	--	--	740	3,700	--	--	--	--	--	--	490	--	220	--	--	--
	6/19/2017	--	--	220	3,200	--	--	--	--	--	--	570	--	150	--	--	--
	6/11/2018	--	--	180	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/11/2018	--	--	170	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/25/2019	--	--	200	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/25/2019 D	--	--	180	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	12/4/2013	<0.020	<1.0	--	5,700	630	410	1.4 J	1.7	0.021	510	550	2.9	3,300	<10	220	220
	12/2/2014	--	--	--	5,700	--	--	--	1.4	0.019	--	630	2.5	3,600	--	--	--
	6/29/2015	--	--	--	5,900	--	--	--	1.1	0.012	--	560	3.5	3,200	--	--	--
	6/29/2015 D	--	--	4.1	5,900	--	--	--	1.0	0.016	--	620	3.2	3,500	--	--	--
	12/15/2015	--	--	--	6,000	--	--	--	--	--	--	680	1.7	3,300	--	--	--
	6/19/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	6/19/2017 D	--	--	4.0	6,000	--	--	--	--	--	--	350	--	3,500	--	--	--
	12/4/2013	<0.020	<1.0	--	6,000	560	760	2.1	4.5	0.077	430	480	1.1	3,700	<10	250	250
	12/2/2014	--	--	--	6,400	--	--	--	3.6	0.056	--	140	2.6	4,200	--	--	--
	6/29/2015	--	--	--	6,300	--	--	--	7.4	0.12	--	230	3.9	4,400	--	--	--
	12/15/2015	--	--	--	6,300	--	--	--	--	--	--	260	1.7	3,500	--	--	--
	6/14/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4
HISTORICAL GROUNDWATER ANALYTICAL DATA - ADDITIONAL COMPOUNDS

Former Agriliance Facility
103 East Mill Road
Artesia, New Mexico

Well ID	Date	Nitrogen Compounds (mg/L)		TOC (mg/L)	TDS (mg/L)	Metals (mg/L)						Inorganic Ions (mg/L)			Alkalinity (mg/L)		
		Ammonia-N	TKN			Calcium	Sodium	Potassium	Iron	Manganese	Magnesium	Chloride	Fluoride	Sulfate	Carbonate (as CaCO3)	Bicarbonate (as CaCO3)	Total Alkalinity (as CaCO3)
MW-5	10/8/2013	0.015 J	<1.0	--	6,000	690	430	13	18	0.43	620	220	4.3	1,800	<10	230	230
	12/4/2013	<0.020	<1.0	--	6,000	490	430	12	1.8	0.07	630	430	3.9	3,800	<10	240	240
	12/2/2014	--	--	--	6,200	--	--	--	10	0.16	--	320	6.0	4,000	--	--	--
	12/2/2014 D	--	--	--	6,300	--	--	--	21	0.35	--	310	5.9	3,900	--	--	--
	6/29/2015	--	--	--	6,100	--	--	--	12	0.23	--	330	5.2	4,000	--	--	--
	12/15/2015	--	--	--	6,100	--	--	--	--	--	--	420	2.8	3,400	--	--	--

Notes

mg/L = Milligrams per liter
TOC = Total Organic Carbon
Ammonia-N = Ammonia + ammonium as nitrogen
TKN = Total Kjeldahl Nitrogen
CaCO3 = Calcium carbonate
TDS = Total dissolved solids
<n = Not detected above the medthod detection limit (MDL)
J = Analyte is present at an estimated concentration between the MDL and report limit.
D = Duplicate sample

Analytical Methods

Ammonia-N & TKN = Standard Method (SM) 4500
TOC = EPA Method 9060 or 5310C
Metals = EPA Method 6020A (ICP-MS)
Alkalinity = SM 4500
Inorganic Ions = EPA Method 300.0 or A4500
TDS = SM 2540C or A2540

TABLE 5
HISTORICAL SOIL SAMPLING ANALYTICAL RESULTS

Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

Boring ID	Sample Date	Sample Depth (feet bgs)	Nitrate+Nitrite-N (mg/kg)
NMED Soil Screening Level =			425
B-1 (removed)	9/29/2008	1	950
	9/29/2008	4	300
	9/29/2008	8	250
B-2	9/29/2008	1	930
	9/29/2008	4	13
	9/29/2008	8	57
B-3	9/29/2008	1	1200
	9/29/2008	4	13
	9/29/2008	8	9.4
B-4	9/29/2008	1	2800
	9/29/2008	4	140
	9/29/2008	8	15
B-5	9/30/2008	1	1800
	9/30/2008	4	36
	9/30/2008	8	170
B-6	9/30/2008	1	1300
	9/30/2008	4	19
	9/30/2008	8	14
B-7	9/30/2008	1	1800
	9/30/2008	4	60
	9/30/2008	8	43
B-8	9/30/2008	1	430
	9/30/2008	4	17
	9/30/2008	8	97
B-9	9/30/2008	1	1900
	9/30/2008	4	81
	9/30/2008	8	12
B-10	9/30/2008	1	1400
	9/30/2008	4	34
	9/30/2008	8	55
B-11	9/30/2008	1	2300
	9/30/2008	4	46
	9/30/2008	8	22
B-12	9/30/2008	1	3100
	9/30/2008	4	24
	9/30/2008	8	74
B-13	9/30/2008	2	680
B-14	9/30/2008	1	380
	9/30/2008	4	48
	9/30/2008	8	36

HISTORICAL SOIL SAMPLING ANALYTICAL RESULTS

Former Agrilience Facility
103 East Mill Road
Artesia, New Mexico

Boring ID	Sample Date	Sample Depth (feet bgs)	Nitrate+Nitrite-N (mg/kg)
NMED Soil Screening Level =			425
B-15 (removed)	9/29/2008	1	2200
	9/29/2008	4	1600
	9/29/2008	8	1300
B-16	9/29/2008	1	630
	9/29/2008	4	33
	9/29/2008	8	110
B-17	9/29/2008	1	610
	9/29/2008	4	240
	9/29/2008	8	12
B-18	9/29/2008	1	1400
	9/29/2008	4	39
	9/29/2008	8	80
B-19	9/29/2008	1	1500
	9/29/2008	4	22
	9/29/2008	8	40

Notes:

bgs = below the ground surface

mg/kg = milligrams per kilogram

Nitrate-N = Nitrate plus nitrite as nitrogen by EPA method 9056

NMED = New Mexico Environmental Department

Soil removed during the 2015 excavation

APPENDIX A

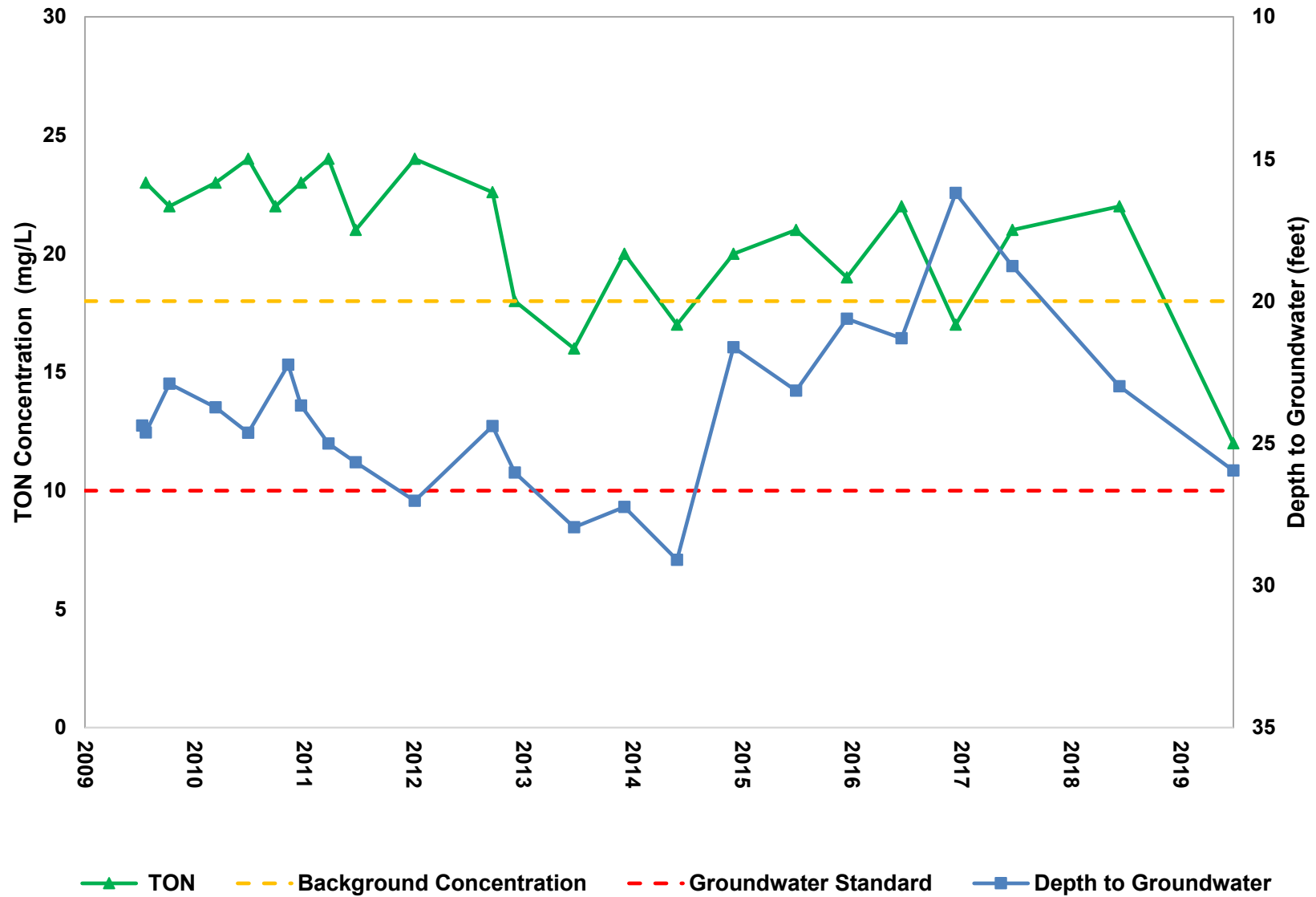
**GRAPHS OF COC CONCENTRATIONS AND
DEPTH TO WATER OVER TIME**

STAGE 2 ABATEMENT PLAN MODIFICATION

Nutrien Ag Solution, Inc.
Artesia, New Mexico

February 2020

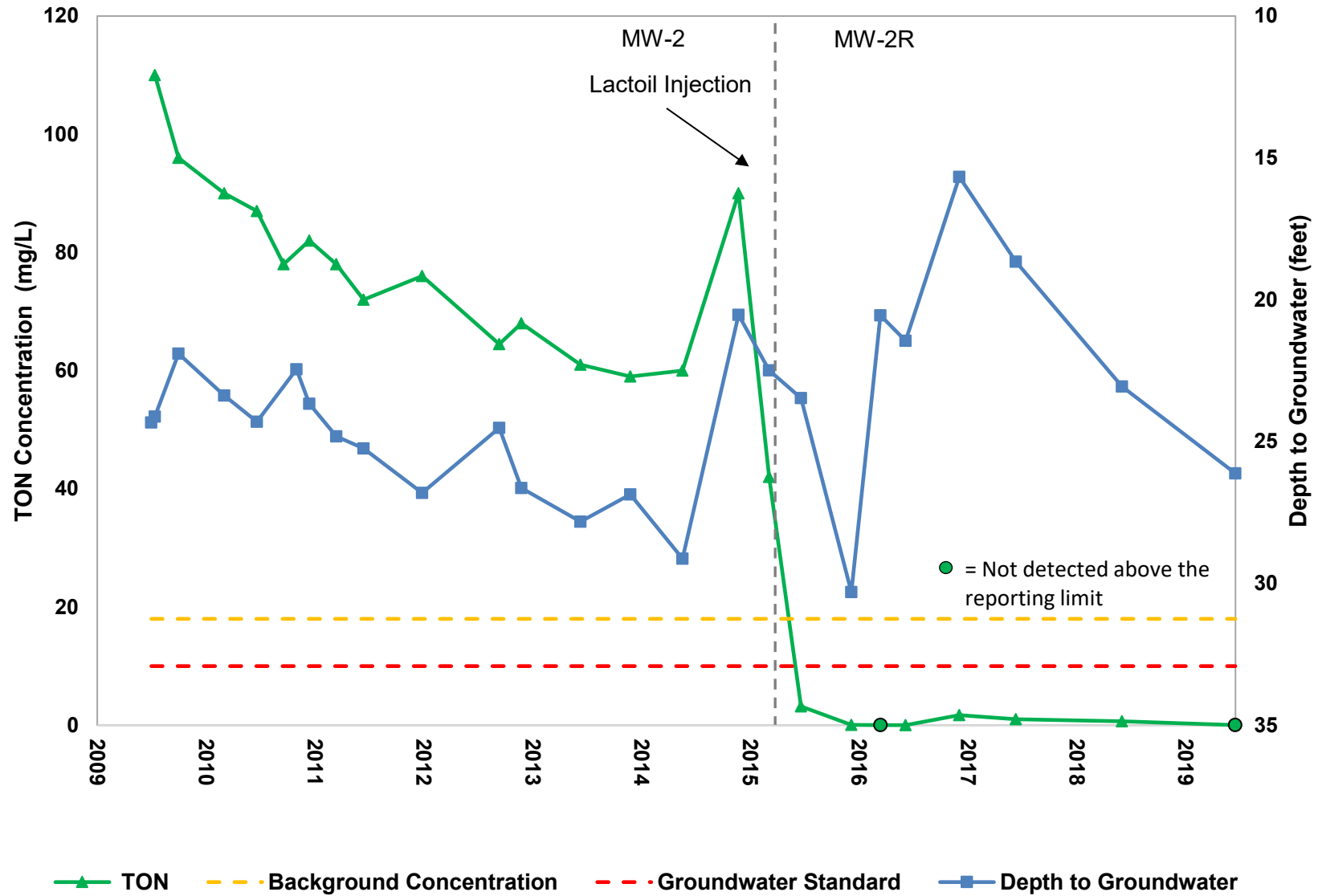
MW-1
Nutrien Artesia Facility
TON Concentrations and Depth to Groundwater over Time



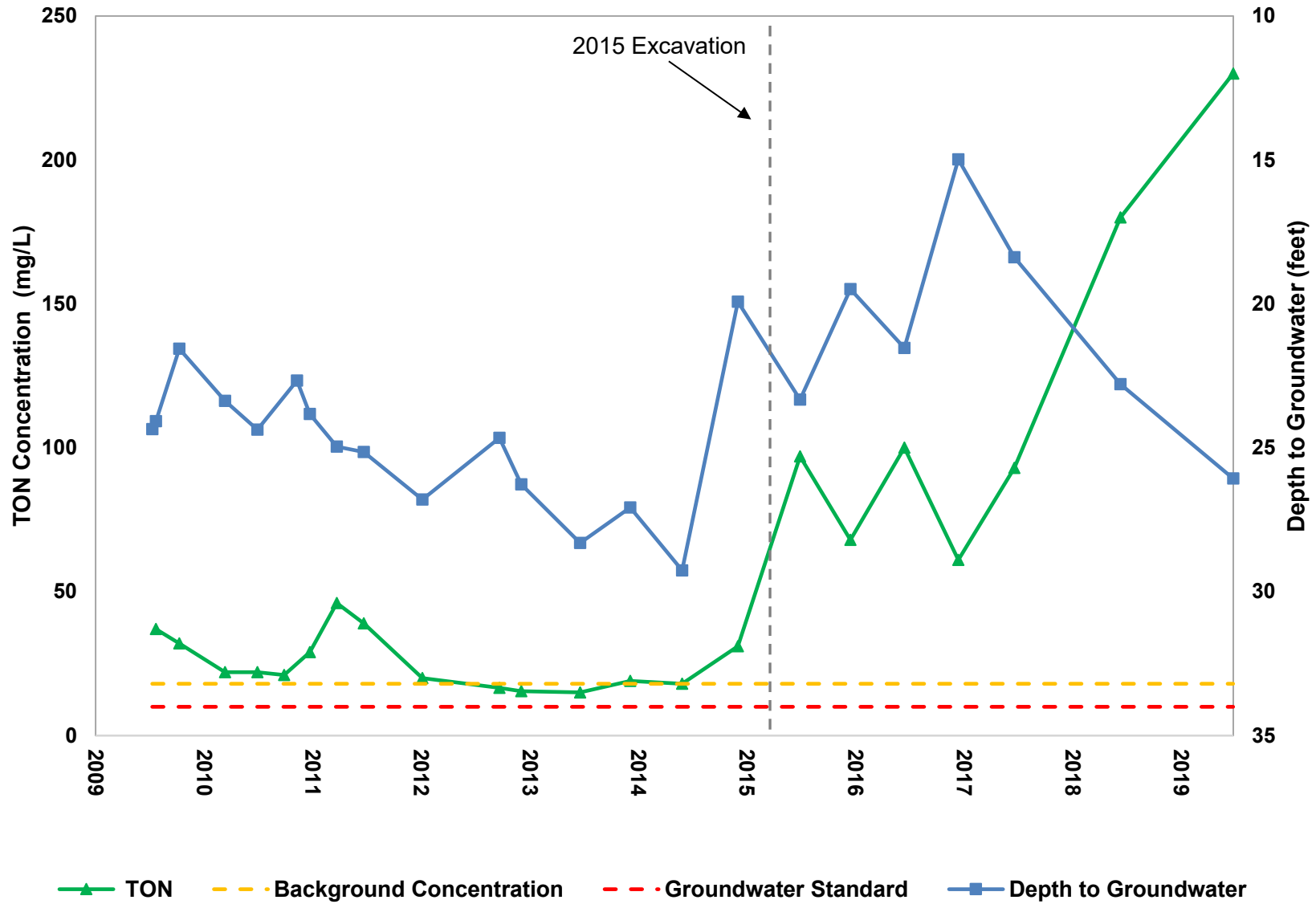
MW-2/2R

Nutrien Artesia Facility

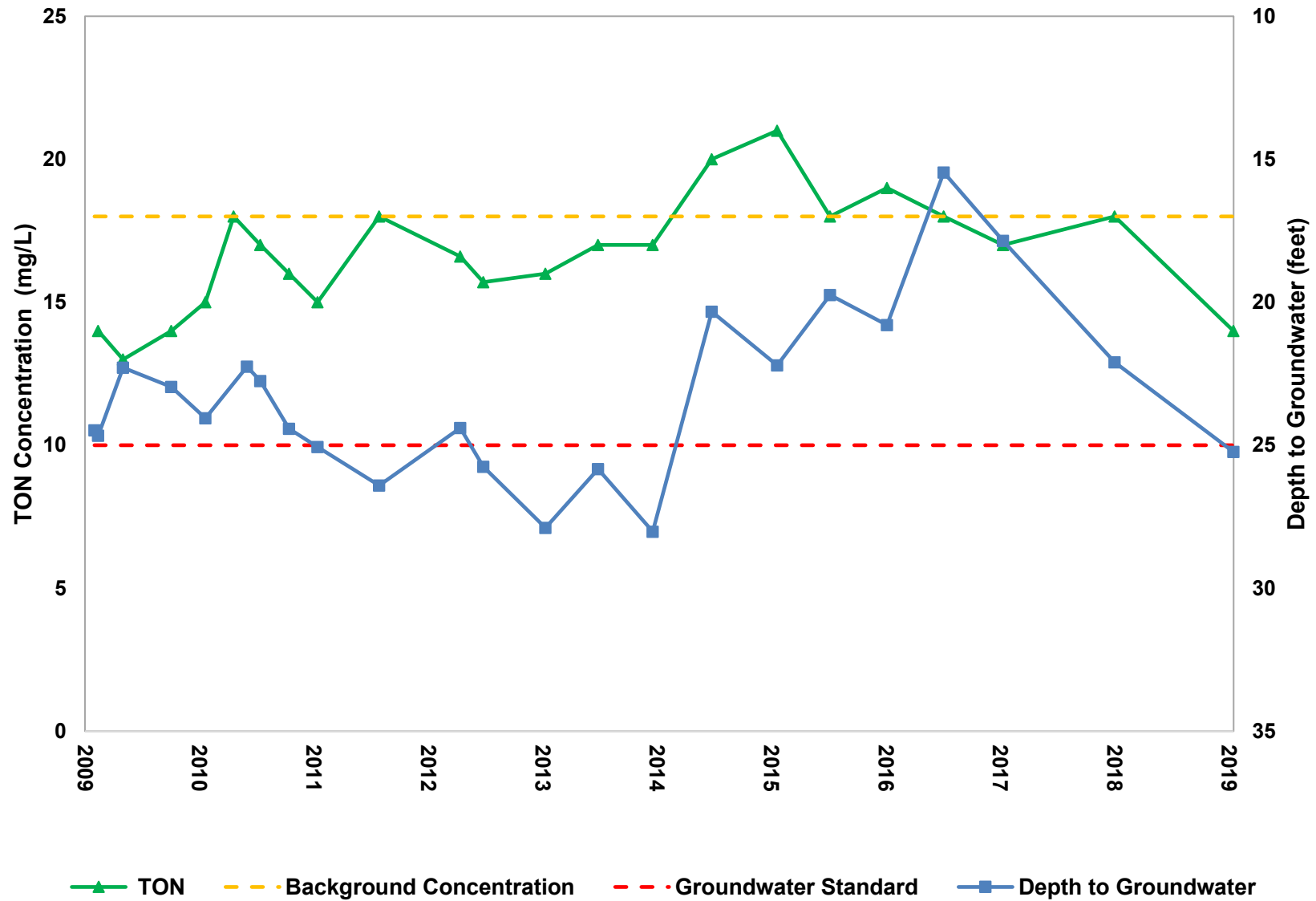
TON Concentrations and Depth to Groundwater over Time



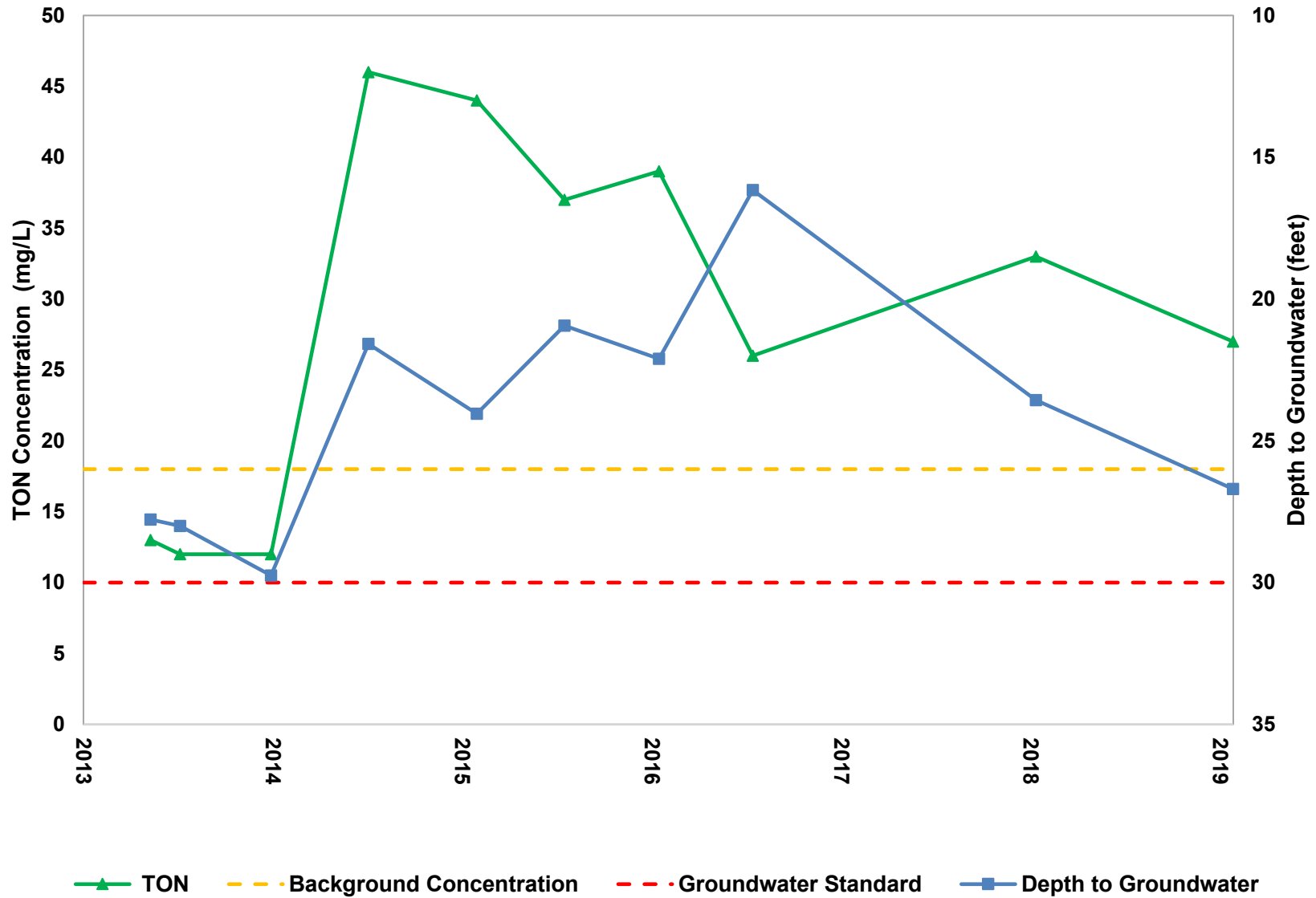
MW-3
Nutrien Artesia Facility
TON Concentrations and Depth to Groundwater over Time



MW-4
Nutrien Artesia Facility
TON Concentrations and Depth to Groundwater over Time



MW-5
Nutrien Artesia Facility
TON Concentrations and Depth to Groundwater over Time



APPENDIX B
LACTOIL PRODUCT INFORMATION SHEET
STAGE 2 ABATEMENT PLAN MODIFICATION
Nutrien Ag Solution, Inc.
Artesia, New Mexico

February 2020

LACTOIL[®]

SOY MICROEMULSION

CONCENTRATED FORMULATION
PROVIDES SAVINGS THROUGH
INCREASED DISTRIBUTION,
EXTENDED LONGEVITY, HIGH
EFFICIENCY

LACTOIL[®] is a thermodynamically stable microemulsion designed to provide the subsurface distribution and remediation performance characteristics of a highly soluble substrate with the longevity of a vegetable oil.



Neat LACTOIL[®]



LACTOIL[®]/Water
After 4 Weeks

INCREASED SUBSURFACE DISTRIBUTION:

- Average particle size < 1 micron
- High emulsion stability allows for greater subsurface transport

EXTENDED LONGEVITY:

- 98% fermentable emulsion
- Emulsion particles contain both readily soluble and slowly soluble material

INCREASED DEGRADATION RATES:

- Provides sustained lactate for accelerated metabolism

HIGHER EFFICIENCY:

- Increased contaminant degradation per unit of fermentable product injected as compared to standard EVO

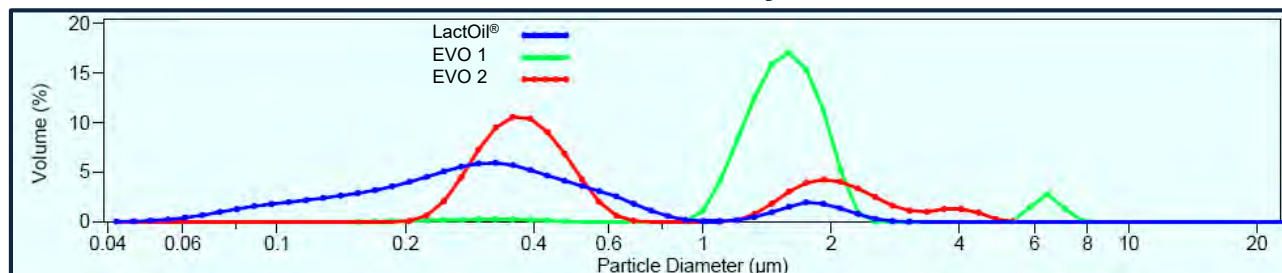
CONTAMINANTS TREATED:

- Chlorinated solvents, nitrates, perchlorate, RDX, metals, trichloropropane, mine impacted water

TREATMENT APPLICATIONS:

- Permanent wells, direct push, excavation backfill, bedrock

Particle Size Analysis



Analysis conducted using 1:10 dilution on a Beckman Coulter Light Scattering Particle Size Analyzer



JRW *BIOREMEDIATION* LLC

www.jrwbioremediation.com

(913)438-5544

info@jrwbiorem.com



Michelle Lujan Grisham
Governor

Howie C. Morales
Lieutenant Governor

NEW MEXICO ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

1190 St. Francis Drive / PO Box 5469
Santa Fe, NM 87502-5469
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www.env.nm.gov



James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

May 22, 2020

Kevin Bertrand
Nutrien Ag Solutions, Inc.
5296 Harvest Lake Drive
Loveland, Colorado 80538
Sent via e-mail: Kevin.Bertrand@nutrien.com

RE: Stage 2 Abatement Plan Modification and Work Plan Approval, Nutrien Ag Solutions facility, Artesia, New Mexico

Mr. Bertrand,

The New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) is in receipt of a Stage 2 Abatement Plan (S2AP) modification and work plan proposal (Plan), dated February 3, 2020, for the Nutrien Ag Solutions (Nutrien) facility located at 103 East Mill Road, Artesia, New Mexico (Site). Rubik Environmental Consulting submitted the Plan on your behalf in response to discussions held with NMED on October 10, 2019 for continued remediation of Site groundwater contaminated by nitrogen compounds.

Key elements of the Plan include:

- The plugging, abandonment, and replacement of MW-1, MW-3, and MW-5;
- Replacement monitoring well development and surveying;
- Injections of Lactoil® to a maximum depth of 40 feet below ground surface (bgs) upgradient of each replacement monitoring well using a truck-mounted direct push rig;
- A single groundwater sampling event prior to Lactoil® injections;
- Post-injection groundwater sampling on a quarterly basis for two years;
- Reporting to NMED after injections are complete and on a quarterly basis thereafter.

The GWQB hereby approves the Plan pursuant to Section 4111 of the New Mexico Ground and Surface Water Protection regulations, 20.6.2 NMAC. Though approval of this Plan constitutes a modification to the current Site S2AP originally approved on January 9, 2015, proposed Plan actions do not constitute a "significant modification of Stage 2 of the abatement plan," as defined in 20.6.2.7 NMAC. Therefore, public notice obligations as listed under 20.6.2.4108 NMAC are not required.

The injection of fluids to facilitate groundwater remediation requires the issuance of a General Discharge Permit per 20.6.2.5002.B(5)(d)(ii) NMAC. Therefore, please submit the attached Notice of Intent to Discharge to the GWQB Pollution Prevention Section (PPS) in accordance with Subsection C of Section 20.6.2.1201 NMAC. To download a digital copy of the form, navigate to

<https://www.env.nm.gov/gwqb/forms/>. In accordance with 20.6.2.4107.B NMAC, NMED also requires at least four working days advance notice prior to conducting any sampling, drilling, or plugging and abandonment activities at the Site.

Approval of this Plan does not relieve Nutrien, pursuant to 20.6.2.4110 NMAC, from the obligation to conduct all investigation, abatement, monitoring, and reporting according to the terms and schedules contained in the approved S2AP, nor does it relieve Nutrien of the responsibility to obtain third-party access or to comply with any other applicable federal, state and/or local laws and regulations, including zoning requirements and nuisance ordinances. Furthermore, it is the responsibility of Nutrien to maintain compliance with the requirements or conditions of any other part or parts of the current S2AP not covered by the activities specified above. If monitoring data or other information indicate the abatement is ineffective or is creating unreasonable injury to health, welfare, environment, or property, NMED may require additional modification of the S2AP pursuant to 20.6.2.4111.B NMAC. Any additional modification of the S2AP must receive prior approval in writing from NMED.

NMED is taking all necessary precautions to reduce the spread of COVID-19. Given the current public health emergency, all S2AP activities must be conducted in accordance with the Governor's current Executive Orders and Public Health Orders. Please help to keep New Mexicans safe by visiting the New Mexico Department of Health's website to learn how you can play a role in stopping the spread of COVID-19. That website is cv.nmhealth.org. If you believe the current COVID-19 restrictions impact your ability to safely complete one or more required S2AP tasks in accordance with an updated S2AP schedule, please include this information with your submittal of the updated S2AP schedule.

If you have any questions, please contact Paul Chamberlain, State Cleanup Program Project Manager at paul.chamberlain@state.nm.us or Justin Ball, Team Leader at justin.ball@state.nm.us. Thank you for your cooperation in this matter.
Sincerely,

Michelle Hunter, Chief
Ground Water Quality Bureau

Cc: Todd Leonard, Rubik, TLeonard@rubikenv.com
Steve Meninger, Rubik, SMeninger@rubikenv.com
Justin Ball, NMED ROS-SCP
Paul Chamberlain, NMED ROS-SCP
ROS Reading File

Attachment: GWQB Notice of Intent to Discharge Form